REMARKS

This paper is responsive to the Office Action dated August 12, 2005 (the "Office Action").

Claims 1-21 were previously pending in the application.

No claims have been added or canceled in this paper.

Accordingly, claims 1-21 remain pending in the application.

Claims 1-21 stand rejected.

Claims 1-10, 12, and 16-21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by F. S. Hillier and G. J. Lieberman, *Introduction to Operations Research*, 6th ed., McGraw-Hill, Inc., 1995 ("*Hillier*"). Claims 11 and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hillier*. Applicant offers that the claims are allowable and respectfully requests reconsideration in view of the following remarks.

Rejections Under § 102(b)

Claims 1-10, 12, and 16-21 stand rejected under § 102(b) as being anticipated by *Hillier*. While not conceding that the Examiner's cited reference qualifies as prior art, but instead to expedite prosecution, Applicant has chosen respectfully to traverse the rejection as follows. Applicant reserves the right, for example in a continuing application, to establish that the Examiner's cited reference does not qualify as prior art as to an invention embodiment previously, currently, or subsequently claimed.

Single-variable analyses in independent claim 1.

Applicant is grateful for the comments in the Office Action regarding the Applicant's remarks of June 10, 2005. One of the comments related to the distinction between single-variable and multi-variable analyses used in the cited sections of *Hillier* and in Applicant's independent claim 1. As noted by the Examiner, both *Hillier* and Applicant's claim 1 address

multivariate problems. Office Action at 2. Applicant wishes to emphasize, however, that the technique by which claim 1 addresses a multivariate problem is not disclosed in the cited art.

First, Applicant notes that Applicant's claim 1 includes limitations that involve single-variable analysis. In particular, the method of claim 1 includes separate single-variable optimization for variables in a multivariate problem. This separated analysis may be seen, for example, in the following limitations from claim 1:

> performing a loading step to form elemental blocks as a function of a single variable with elements being loaded with resources that gate production of the element;

> performing a re-loading step to form elemental blocks as a function of a single variable with elements being reloaded with resources that gate production of the element;

> solving for the maximum of each elemental block over each associated single variable, wherein the solving is performed by a computer.

These limitations include the use of elemental blocks that are each a function of a single variable. For each block, and thus for each associated single variable, the method includes solving for a maximum. As a result, the method includes acts that provide several maxima, with each maximum corresponding to a single one of the multiple variables involved in the analysis.

The variable-by-variable technique set forth in Applicant's claim 1 may provide useful advantages over standard brute-force multivariate techniques. First, the solution of m separate single-variable problems may be computationally faster than the solution of one multivariate problem with m variables. Second, the solution of m separate single-variable problems is usually more readily addressed by automated techniques, in comparison with multivariate problems that generally require different approaches depending on the specific nature of the multivariate problem. Thus, it is generally considered helpful to at least partially re-cast a multivariate problem into several single-variable problems. Not all problems are amendable to such analysis, and thus multivariate problems often require the use of purely multivariate techniques to find a solution. However, when a problem can be recognized as one that can be decomposed into variable-by-variable analyses, this decomposition is generally helpful.

The techniques set forth in Applicant's specification and in claim 1 recognize that certain problems may be amenable to such a decomposition. Applicant's claim 1 sets forth a method

Application No.: 09/491,461

that may be used in a multivariate situation where resources, products, and their respective connectivities are represented in a product space plan. The method includes at least a partial decomposition of the analysis into several single-variable problems that are solved separately, using the loading, re-loading, and solving acts noted above. Applicant's claim 1 thus sets forth tools by which a typically difficult problem—the solution of a multivariate problem, may be at least partially analyzed as a typically simpler problem—the solution of several single-variable problems.

Second, Applicant maintains that *Hillier* does not disclose the decomposition of a multivariate problem into several single-variable problems for the type of situation addressed in Applicant's claim 1. *Hillier* describes a multivariate problem—the Wyndor Glass Co. example, and uses only multivariable techniques to solve this problem.

During the discussion of the Wyndor Glass Co. example, *Hillier* mentions single-variable situations twice. As noted in the Office Action of April 7, 2005, *Hillier* refers to a single-variable equation on p. 565: "$d^2f/dx^2 \leq 0$." However, this equation is not used in the solution of the Wyndor Glass Co. example. Rather, is discussed as a single-variable analogy to illustrate the concept of local and global maxima. *Hillier* returns to using multivariable equations when the discussion returns to the Wyndor Glass Co. example on p. 567 (referring to figs. 13.6 and 13.7).

The other mention of single-variable situations is on p. 563 of *Hillier*, as noted in the present Office Action. Here, *Hillier* notes that "[w]hen a nonlinear programming problem has just one or two variables, it can be represented graphically much like the Wyndor Glass Co. example . . . ." The Office Action implies that this statement indicates that the Wyndor Glass Co. example is a single-variable problem. Applicant respectfully disagrees. As may be seen, for example on pp. 27-28 of *Hillier*, the Wyndor Glass Co. example is a multivariable problem: it involves two variables x_1 and x_2.

(On p. 3, the Office Action also notes that *Hillier* refers to "*nonlinear* variations of the Wyndor Glass Co. problem." *Hillier* at 563. (Emphasis in original.) The Office action implies that this statement indicates that the Wyndor Glass Co. problem is a single-variable problem. Applicant respectfully disagrees. This statement in *Hillier* may be understood as indicating (correctly) that the Wyndor Glass Co. problem is a linear problem—however, just because the

Application No.: 09/491,461

Wyndor Glass Co. problem is *linear* problem does not mean that it is a *single-variable* problem. Indeed, as noted above, the Wyndor Glass Co. problem is a multi-variable problem, since it involves two variables x_1 and x_2.)

While *Hillier* mentions the concept of single-variable equations, *Hillier* does not describe the use of piece-by piece single-variable analyses to attack a multivariable problem. *Hillier* does not describe, teach, or suggest separate single-variable optimization for variables in a multivariate problem to address the type of situation presented in Applicant's claim 1.

At least for these reasons, independent claim 1 is allowable under § 102(b). Claims 2-10 depend directly or indirectly on claim 1, and are also allowable for at least the same reasons, being dependent on an allowable base claim. Accordingly, Applicant respectfully requests that the pending rejections under § 102(b) to claims 1-10 be withdrawn.

Reloading components in independent claims 12.

Applicant submits that pending independent claim 12 is allowable because the cited art also fails to describe a variety of limitations in this claim. Independent claim 12 is directed to an automated method and includes, for example, a limitation of:

> performing a reloading step which reloads components that were unloaded from an element in the loading step.

This limitation is neither described, taught, not disclosed in *Hillier*. With respect to this limitation, the Office Action makes reference to pp. 564-65 of *Hillier*, and indicates that the reloading step and other steps are "viewed by the examiner as the iterations involved when solving a non-linear optimization problem." *See* Office Action at 4. Applicant respectfully submits that the cited sections of *Hillier* do not discuss iterations in solving optimization problems. Further, Applicant respectfully submits that *Hillier* does not disclose a reloading step that reloads components that were unloaded from an element in a loading step.

The cited art therefore fails to disclose each of the limitations of claim 12. At least for these reasons, independent claim 12 is also allowable under § 102(b). Independent claim 21 is also allowable at least for similar reasons. Claims 16-20 depend directly or indirectly on claim 12, and are also allowable for at least the same reasons, being dependent on an allowable

Application No.: 09/491,461

base claim. Accordingly, Applicant respectfully requests that the pending rejections under § 102(b) to claims 12 and 16-21 be withdrawn.

Rejections Under § 103(a)

In the context of claims 11 and 15, an inverse Cholesky transformation is not well-known.

Claims 11 and 15 stand rejected under § 103(a) as being unpatentable over *Hillier*. The Office Action states that limitations of these claims are well known. Applicant respectfully disagrees, and respectfully submits that claims 11 and 15 are allowable under § 103(a).

Regarding claims 11 and 15, the Office Action notes that *Hillier* does not expressly disclose using an inverse Chloesky transformation. Office Action at 11-13. In support of the rejections, however, the Office Action argues that this feature is well-known. Applicant respectfully traverses the rejections as set forth below.

With respect to claims 11 and 15, the Office Action argues that using an inverse Cholesky transformation to transform values and variables is well known in the art of matrix algebra and mathematics, and that it would have been obvious to one of ordinary skill in the art at the time of the invention to use an inverse Cholesky transformation in the working transformed space of *Hillier* in order to increase the efficiency of manipulating and solving the equations of *Hillier*. *Id.* at 12.

Applicant respectfully disagrees. Applicant respectfully submits that it would not have been obvious to one of ordinary skill to specifically select an inverse Cholesky transformation for use in solving the situation set forth in *Hillier*. In particular, Applicant maintains that an inverse Cholesky transformation would not be a well-known tool for transforming a product space plan into a working transformed space plan, where the products are transformed into working elements, as set forth in the base claim 1. Applicant respectfully submits that the inverse Cholesky transformation is a novel and non-obvious approach to addressing the type of problem addressed in Applicant's claims 11 and 15. For these reasons, Applicant traverses the rejections under § 103(a) of claims 11 and 15.

In a discussion of rejections that rely on "well known" prior art, the MPEP states:

> If applicant adequately traverses the examiner's assertion of official notice, the examiner must provide documentary evidence in the next Office action if the rejection is to be maintained. If the examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding.

MPEP § 2144.03(C) (citations omitted).

In traversing the rejections of claims 11 and 15, Applicant respectfully requests that the Examiner cite a reference in support of the position that it would be obvious to use an inverse Cholesky transformation in conjunction with the other limitations of these claims. If it is the Examiner's position that the rejection is based on personal knowledge, Applicant respectfully requests that the facts be supported by an affidavit or declaration from the Examiner.

The proposed modifications to Hillier *would render the analysis therein unsatisfactory for its intended purpose.*

With respect to claims 11 and 13-15, the Office Action's proposed modifications of *Hillier* would render the teaching in *Hillier* unsatisfactory for the intended purpose of analyzing the nonlinear Wyndor Glass Co. example. "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP § 2143.01 (citing *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984)).

The Office Action proposes modifying *Hillier* to incorporate the use of an inverse Cholesky transformation, or to incorporate the use of an elliptical family of distributions. Office Action at 12. As noted by the Examiner, such transformations and distributions are not disclosed in the cited art. *Id.* The cited material in *Hillier* is used to provide a model of the nonlinear Wyndor Glass Co. example, which is analyzed to completion in that text. If the modeling were modified by changing one or more of the equations therein to incorporate an inverse Cholesky transformation, or to incorporate an elliptical distributions, the resulting modeling would not likely yield a sensible analysis of the nonlinear Wyndor Glass Co. example, or of problems of that type. Such modifications would be inappropriate for the type of example cited in *Hillier*.

Application No.: 09/491,461

These proposed modifications would render the teachings of *Hillier* unsatisfactory for the purpose of examining the Wyndor Glass Co. example or related problems.

Accordingly, Applicant respectfully submits that the pending rejections of claims 11 and 13-15 under § 103(a) fail to state a prima facie case of obviousness. Applicant respectfully offers that claims 11 and 13-15 are allowable under § 103(a).

The rejections under §103(a) depend on cited art that does not disclose each limitation of the claims.

Additionally, even if *Hillier* were modified as proposed in the Office Action, the result would not describe, teach, or suggest all of the limitations of the claimed invention. For example, as discussed above, *Hillier* does not disclose a number of limitations of the Applicant's independent claims. This observation applies with equal weight to all of the pending rejections under § 103(a). Further, such limitations are also not present in the *Hillier* reference even with the Examiner's proposed modifications.

For example, claim 11 depends indirectly on claim 1, which includes the limitations of:

performing a loading step to form elemental blocks as a function of a single variable with elements being loaded with resources that gate production of the element;

performing a re-loading step to form elemental blocks as a function of a single variable with elements being reloaded with resources that gate production of the element;

solving for the maximum of each elemental block over each associated single variable, wherein the solving is performed by a computer.

Claims 13-15 depend on claim 12, which includes the limitations of:

performing a reloading step which reloads components that were unloaded from an element in the loading step.

As discussed above, these limitations are not disclosed in *Hillier*. For these reasons as well, claims 11 and 13-15 are allowable under § 103(a). In view of these arguments, Applicant respectfully requests that the pending rejections under § 103 to claims 11 and 13-15 be withdrawn.

Application No.: 09/491,461

CONCLUSION

Applicant submits that all claims are now in condition for allowance, and an early notice to that effect is earnestly solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is requested to telephone the undersigned.

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Attorney for Applicant   Date of Signature

Respectfully submitted,
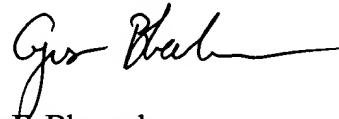
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